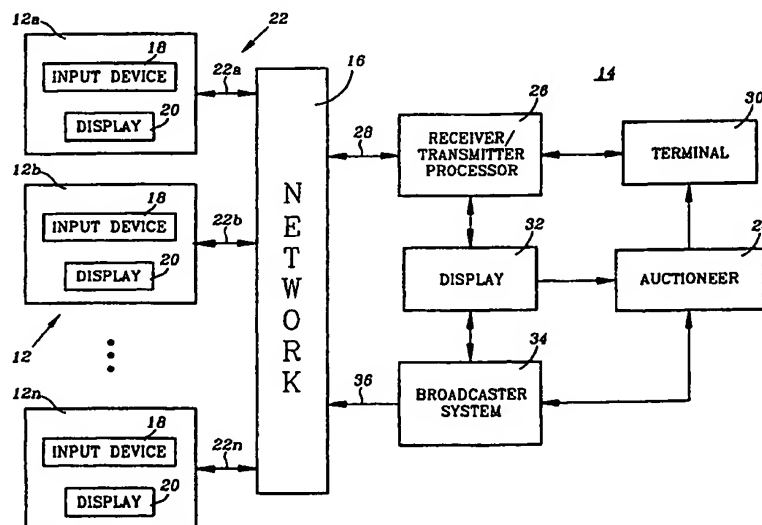




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(54) Title: INTERACTIVE REMOTE AUCTION BIDDING SYSTEM



(57) Abstract

An interactive remote auction bidding system for conducting an auction among participants located at remote locations from the auction site utilizes a data input device for communication over a network to the auction site. The system includes a data processor located at the auction site for generating bid information for communication over the network to the remote locations. A processor located at the auction site monitors the participants' data input devices for sensing participant bids generated by the participants' data input devices. The system further displays visual bid information at the auction site for transmission over the network to the participants and generates audible bid information in support of that visual bid information.

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INTERACTIVE REMOTE AUCTION BIDDING SYSTEM

TECHNICAL FIELD OF THE INVENTION

The present invention relates to an interactive communications system, and more particularly, to an interactive remote auction bidding system allowing a plurality of bidders to participate in an auction on a real-time basis from multiple remote locations.

BACKGROUND OF THE INVENTION

Remarketing surplus products is a challenge for manufacturers and dealers in many industries, and in particular the equipment industry. Stale new inventory and "slightly used" product competes for customers with goods direct from the assembly lines. Equipment ownership and usage patterns have changed and continue to change. Whereas most new product was once sold to end users, now many industry segments deliver more than 65% of new product to "Rental/Lease Fleets". Equipment sold is often guaranteed for its future value. Customers have transferred many elements of ownership risk to manufacturers and dealers by forcing sellers to provide rentals, leases, or future value guarantees. Consumer preference to rent is driven by a composite of factors including tighter lending standards, lack of tax incentives, increasing complexity and specialization of equipment, volatility of equipment values within their industries and increasing availability and competitiveness of short term equipment rental solutions. Rentals, long term leases and "buy back" agreements provide customers use of equipment without the ownership obligations or liabilities. Manufacturers and Dealers remain "at risk" and responsible for rental, lease and "buy back" equipment until its ultimate sale. In view of these marketing techniques, as well as improvements in the useful life of a product, the burden of remarketing more of these products after their first substantial use remains with manufacturers, dealers and other rental operators. In many cases, the most severe competition for new sales is generated by identical "used product" rather than by new product of competitive manufacturers.

Manufacturers and dealers have achieved success generating sales of new products, but typically have less success remarketing used equipment and transferring ownership obligations to end users. "After market" remarketing specialists such as brokers, traders, import-export entrepreneurs and retail auctioneers provide needed expertise for second and subsequent sales of equipment. These remarketing specialists sell in direct competition to new products sold by dealers and manufacturers.

Due to the diverse demographics of their markets, and fractured communication among dealers, dealers' effectiveness is limited to small geographic areas in proximity to their dealership. Dealers have limited knowledge or success trading outside local trading areas. Manufacturers encourage "local" market focus. Whereas "local" focus for new equipment may be effective, remarketing surplus equipment locally limits potential and is largely an ineffective and costly strategy. At the same time, effort expended, travel costs, language, currency, cultural and information barriers plus lack of critical mass in any single market make venturing beyond local trade areas expensive, risky, inefficient, and often counterproductive for dealers. Accordingly, remarketing used equipment has been inefficient.

Conventionally, auctions of used equipment or the like require that the equipment be brought to the auction site and presented by the seller where the auction takes place. Additionally, all participants to the auction must assemble at the auction site. Such an auction therefore is typically limited to regional geographic areas due to the costs of assembling equipment as well as participants. Scale is crucial to auction success. Scale attracts buyers. The more buyers the better the result. The more specialized the product, the greater the distance both buyer and product must travel for the auction to achieve scale or critical mass. Freight on large equipment is expensive, and moving equipment to an auction site, and then removing the same equipment, if not sold, produces an inefficient non-value added expense. These expenses are further incurred by buyers traveling to auctions.

A need has thus arisen for a "real-time" auction information processing system which enables individuals dispersed over a wide geographic area to participate in an auction without gathering at the auction site. A need has further arisen for a system to allow individuals to participate in an auction without requiring a large investment in a technical infrastructure at the buyers'/bidders' remote locations.

SUMMARY OF THE INVENTION

In accordance with the present invention, an interactive remote auction bidding system for conducting an auction among participants located at remote locations from the auction site is provided. Each of the participants at a remote location utilizes a data input device for communication over a network to the auction site. The system includes a data processor located at the auction site for generating bid information for communication over the network to the remote locations. A processor located at the auction site monitors the participants' data input devices for sensing participant bids generated by the participants' data

input devices. The system further displays bid information at the auction site for transmission over the network to the participants.

BRIEF DESCRIPTION OF THE DRAWINGS

For a more complete understanding of the present invention and for further
5 advantages thereof, reference is now made to the following Description of the Preferred Embodiments taken in conjunction with the accompanying Drawings in which:

FIG. 1 is a block diagram of the present system; and

FIGs. 2-4 are flow charts illustrating the overall process of the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

10 Referring to FIG. 1, an interactive remote auction bidding system for conducting an auction among participants located at remote locations is illustrated, and is generally identified by the numeral 10. System 10 allows participants located at remote locations 12, 12a, 12b-12n to communicate with an auction site 14 via a communications network 16. Located at each remote site 12 is a data input device 18. Data input device 18 may comprise, for example, a
15 conventional Touch Tone® telephone having a key pad which generates dual-tone multi-frequency signals (DTMF). Additionally, data input device 18 may include a cellular telephone, two-way pager, other radio wave transmitter/transponder, or personal computer, for generating bid acceptance data for communication over the network 16 to auction site 14. Each remote location 12 further includes a display device 20. Display device 20 receives information
20 from auction site 14 via network 16, and may include, for example, a conventional television, video telephone conferencing display, or a personal computer display. Communication between remote sites 12 and network 16 takes place over communications links 22, 22a, 22b-22n.

Communications network 16 may include, for example, and is not limited to, a
25 conventional telephone network, cellular network, satellite communications system, cable broadcast system, and television broadcast system. Network 16 may comprise a combination of various types of communications systems for communicating data between remote locations 12 and auction site 14. The configuration of network 16 depends upon the type of equipment used by participants at remote locations 12, and in its simplest form will include a telephone
30 switching network and broadcast television system, and in its most state of the art form, the configuration will include the Internet.

Auction site 14 comprises a location remote from the participants at which bids are accepted and the auction is controlled. The auction is controlled by an auctioneer 24 located at auction site 14. Auctioneer 24 functions in a capacity similar to the capacity of an auctioneer in a typical auction where participants are located at the auction site. Equipment to be auctioned
5 at auction site 14 may or may not be physically present at auction site 14. Located at auction site 14 is a receiver/transmitter processor 26 which receives and transmits bid information via network 16 to and from remote locations 12. Receiver/transmitter processor 26 may include, for example, a dual-tone multi-frequency receiver/processor for monitoring DTMF signals generated by input devices 18 at each remote site 12. Additionally, processor 26 may include
10 voice recognition technology for receiving and decoding voice input from input device 18. Processor 28 is capable of identifying and monitoring each input device 18 from a remote site 12 as well as communicating via network 16 with each remote site 12.

Additionally, processor 26 receives initialization parameters, to be subsequently described, for the auction via a terminal 30. Initialization parameters are selected by auctioneer
15 24 and input to processor 26 via terminal 30. Processor 26 controls a display 32 located at auction site 14. Display 32 displays information such as, for example, the asking bid, current bid, bidder identification, location of bidder, and lot number. Where the auction is conducted across national boundaries, the asking bid and actual bid may be displayed in numerous foreign currency denominations. The information generated by processor 26 and displayed on display
20 32 is communicated to participants at remote locations 12 via a broadcaster system 34. Broadcaster 34 may include a conventional broadcaster television system whose output is supplied via communications link 36 to network 16. Broadcaster 34 may include a conventional television system, in addition to a satellite communications system, cable network, or the like. Information generated by broadcaster system 34 is displayed on displays 20 at each
25 remote location 12. Broadcaster system 34 may capture a live "picture" of the auctioneer 24 at auction site 14 conducting the auction including pictures and other details of the equipment being auctioned. In this manner, each participant at remote location 12 has the sense of physically being present at auction site 14 during the auction. Broadcaster system 34 further captures information displayed on display 32 for transmission to each remote location 12. In
30 this manner, during the bidding process real-time information is available to each bidder at remote site 12 during the auction.

Referring now to FIG. 2, prior to commencement of the auction, communications paths are established between each remote location 12 and the auction site 14 via network 16. For example, a bidder at remote location 12a places a telephone call to the auction site 14 using

a telephone input device 18. A bidder may call a 1-800 telephone number to auction site 14 at step 40, thereby establishing a communications path via link 22a, network 16, and link 28 to receiver/transmitter processor 26. Acknowledgment of the call to the participant at location 12a is made by processor 26 by generating a greeting to the participant and a prompt for the participant's password at step 42. Upon hearing the prompt, the participant inputs a password utilizing input device 18. A decision is made at step 44 by processor 26 to determine whether the password has been correctly input by the participant. If no password has been input, the telephone call is terminated by processor 26 at step 46. If the proper password has been input and received by processor 26, processor 26 prompts the participant at remote site 12a for a personal identification number (PIN) at step 48. The participant then enters the participant's PIN number through input device 18. Processor 26 then determines at step 50 whether a proper PIN number has been received. If no proper PIN number has been received, the telephone call is terminated at step 52. If the PIN number has been received, processor 26 prompts the participant for the participant's bidder number at step 54. Processor 26 then determines whether a proper bidder number has been input by a participant at step 56. If the bidder number has been entered and accepted, the process continues to step 70 (FIG. 3).

If processor 26 determines that no correct bidder number was input from a participant at remote location 12a, processor 26 assigns a bidder number to the participant at step 58. Processor 26 then prompts the participant for a bidder number at step 60. The participant then inputs the newly assigned bidder number and processor 26 determines if the bidder number has been input at step 62. If no bidder number has been input, the telephone call is terminated at step 64. If an acceptable bidder number has been input at step 62, the process continues at step 70 (FIG. 3).

At this point, prior to commencement of the auction, each participant at remote locations 12 are linked via network 16 to auction site 14. Processor 26 continuously monitors each input device 18 at remote locations 12 as well as transmits data to each remote location 12 over the established communication links. Prior to commencement of the auction, data such as, for example, sales information, auction messages and instructions, and music may be transmitted to each remote location 12.

Referring now to FIG. 3, prior to commencement of an auction, various parameters are initialized and displayed at auction site 14 at step 66. Auctioneer 24 via terminal 30 inputs to processor 26 data relating to a lot number, the initial asking bid, a predefined increment, and foreign currency conversion factors for currency denominations for the remote locations participating in the auction. This information is utilized by processor 26 to generate data for

display 32. Display 32 in turn provides data to broadcaster system 34 which communicates the information on display 32 via communications link 36, network 16, and communications link 22 to displays 20 at remote locations 12. Therefore, prior to commencement of the auction of each lot, each participant possesses information relating to the lot number, asking bid and its
5 equivalent in any foreign currencies involved in the auction. Throughout the auction, display 32 is updated to reflect actual bids made during the auction (and may further include the amount required to displace the last bid) such that each participant at a remote location 12 participates in real-time at the auction and has current bidding information. The effect of the "real-time" display and participation is that while some minimal communication/calculation
10 delays may be present, participants will be able to effectively interact with and see current information on the auction process as if the participants were actually present at auction site 14.

An additional parameter that is initialized is the duration or cycle time during which bids are accepted. This parameter may also be adjusted by auctioneer 24 during the auction.

After initialization of the system, processor 26 begins accepting bids at step 70 from
15 the participants at remote locations 12. Participants at locations 12 utilizing input device 18 generate bid acceptance signals by utilizing input devices 18 such as, for example, by pressing the "#" symbol key on a keypad of a telephone input device 18. Those participants not wishing to enter a bid, do not touch any key on the telephone. Where processor 26 includes voice recognition capabilities, a participant may indicate acceptance of a bid by speaking into
20 input device 18 such as "yip". Processor 26 continuously monitors communications link 28 for input bids at step 72.

Processor 26 determines at step 74 whether a bid has been accepted. If a participant's bid has not been accepted, a response is generated to each participant whose bid has not been accepted at step 76. The response may include a predetermined tone generated by transmitter
25 26 such as, for example, a "honk" sound or the words "Bid not taken, please bid again" communicated to a participant through device 18. If a bid has been accepted, a response is generated to the participant at step 78 such as, for example, by generating a tone at transmitter 26 in the form of a "beep" sound or the words "Bid taken" indicating to the particular participant at a remote location 12 that the bid has been accepted. At step 80, a decision is
30 made to determine whether the particular participant at remote location 12 has indeed made the bid. The response to the bidder at step 78 includes a prompt to confirm whether the participant made the bid. The participant may actuate a key on a telephone key pad at input device 18 to confirm the bid, if the bid is not confirmed, a subsequent prompt may be generated to the participant, the participant may be routed to a help desk number, but after a

predetermined time, if no confirmation is received, the participant may be locked out of participating in the next bid cycle at step 82. Alternatively, in some embodiments, step 80 may be bypassed to increase the pace on the assumption that the already screened participants are sincere. In this event only the winning bid is confirmed as in step 102 below.

5 Assuming that confirmation has been received (or alternatively bypassed) from the particular participant that a bid has been made, display 32 is updated at step 82. Display 32 generates the current bid, the location of the bidder, and bidder identification. Auctioneer 24 is also provided with bid acceptance information at step 84. At this point in the bidding process of the auction, each participant receives real-time information acknowledging bid receipt and
10 the present status of the auction. All participants in the auction know the location of the bidder, the amount of the accepted bid in the participant's currency value, and the bidder identification number of the accepted bid.

 A decision is then made by auctioneer 24 at step 86 as to whether the accepted bid was the final asking bid for the lot. If the decision is yes, the process continues to step 100
15 (FIG. 4). If the bid is not the final asking bid at step 86, the asking bid is incremented in accordance with the predetermined increments established at initialization at step 66. The asking bid is then incremented and display 32 is updated at step 90. Additionally, the new asking bid can be adjusted in real-time by auctioneer 24 as the bidding approaches the final bid. The new asking bid is subsequently communicated to participants via broadcaster system 34.
20 The asking bid is incremented and a predetermined delay is incorporated into processor 26 before processor 26 begins accepting subsequent bids from participants at locations 12. In this manner, processor 26 controls subsequent bid acceptances to prevent overrunning of system 10 and establishes a bidding acceptance window of time. The delay is adjustable by auctioneer 24 based upon the particular bidding environment and aggressiveness of participants. After
25 display 32 has been updated with current bidding information, the predetermined delay elapsed, new bids are then accepted at step 70. The process continues as asking bids are incremented and accepted until the auctioneer determines that the final asking bid has been accepted at step 86, and the process continues to step 100 (FIG. 4).

 Auctioneer 24 may provide a warning that the current bid is about to be accepted as
30 the winning bid. The warning may be communicated through audio feedback (such as a drumroll) or video feedback (such as a flashing bid amount or change in color of bid amount) in display 32. Acceptance of the final bid by auctioneer 24 may also generate a real-time response in the display 32 such as a cymbal-crash or visual acceptance signal with the accepted bid amount. With the acceptance of the final bid, the auctioneer blocks or locks out all

participants but the winning bidder and proceeds to the confirmation process with the winning bidder.

Referring now to FIG. 4, with the acceptance of the final asking bid the last bidder is notified that the final bid is a winning bid at step 100. Processor 26 notifies the winning bidder and prompts the winning bidder to determine a confirmation at step 102. If confirmation is not received, a notice is provided to auctioneer 24 at step 104. Auctioneer 24 will then provide subsequent instructions to terminal 30 for communication to the winning bidder participant. If confirmation is received at step 102, a decision is made at step 106 to determine if the previous lot was the last lot in the auction. If the decision is yes, the call communication path between remote locations 12 and auction site 14 is terminated at step 108. The auctioneer may also chose to reopen bidding to the entire audience at the level of the previous bid. If subsequent lots are to be auctioned, the process continues to step 66 (FIG. 3) and new parameters are initialized and displayed for a subsequent lot to be auctioned.

During the bidding process, processor 26 maintains an audit trail of each participants' response, whether the bid is accepted or not.

It therefore can be seen that the present remote auction bidding system allows participants at remote locations from the auction site to participate in an interactive manner in an auction. Participants view a real-time video broadcast, via video conference, broadcast television, satellite, cable or Internet transmission and communicate bids utilizing an input device such as, for example, a traditional telephone. The auction is capable of incorporating and receiving bids from remote participants having multi-cultures, language, and currencies. Although more sophisticated communication devices including, for example, two way pagers, voice recognition systems, and the Internet may be utilized with the present invention, typical telephone devices provide for a simple, low cost, communication vehicle for participating in an auction conducted utilizing the present system. The communications network merely requires a telephone infrastructure which can be based upon, for example, typical long distance telephone lines, cellular systems, and satellite communication systems. The present system is scalable to accommodate unlimited numbers of participants based upon the size of the communications processor utilized at the auction site. Additionally, communications via network 16 may be secured utilizing encryption of data between the auction site and remote locations.

Whereas the present invention has been described with respect to specific embodiments thereof, it will be understood that various changes and modifications will be suggested to one skilled in the art and it is intended to encompass such changes and modifications as fall within the scope of the appended claims.

CLAIMS:

1. An interactive remote auction bidding system for conducting an auction among bidders located at remote locations from the auction site, each of the bidders having a data input device for communicating over a network to the auction site, the system comprising:
5 means located at the auction site for generating bid information and for transmitting said bid information to the bidders at the remote locations utilizing the network;
means located at the auction site for monitoring the network and the data input devices and for sensing bidder bid acceptances generated by bidders utilizing the data input devices; and
10 means located at the auction site for displaying in real-time, bid information for transmission to the bidders at the remote locations utilizing the network.
2. The system of Claim 1 wherein the data input devices include telephones and said means for monitoring and sensing includes a dual tone multi-frequency receiver/processor.
3. The system of Claim 1 wherein said sensing means senses bid acceptances during a predetermined time period.
4. The system of Claim 1 wherein said display means includes a display of a lot number, a current bid, an asking bid, and bidder identification.
5. The system of Claim 1 wherein said display means includes a display of a plurality of currency values representing a current bid and an asking bid.
6. The system of Claim 1 wherein said display means includes a video display of the auction site.
7. The system of Claim 1 wherein said bid information generated by said generating means includes asking bids and asking bid increments.

8. An interactive remote auction bidding system for conducting an auction among bidders located at remote locations from the auction site, each of the bidders having a data input device for communicating over a network to the auction site, the system comprising:
- 5 means located at the auction site for generating asking bids, bid increments and bids in a plurality of currency valuations;
- means located at the auction site for monitoring the network and for sensing bidder bid acceptances generated by the bidders utilizing the data input devices during a predetermined time period;
- 10 means located at the auction site for displaying in real-time, current bid acceptances, an asking bid and bidder information; and
- means located at the auction site for broadcasting in real-time, current bid acceptances, an asking bid and bidder identification to the bidders at the remote locations utilizing the network.
9. The system of Claim 8 wherein the data input devices include telephones and said means for monitoring and sensing includes a dual tone multi-frequency receiver/processor.
10. The system of Claim 8 wherein said display means displays a current bid and an asking bid in a plurality of currency values.

11. A method for conducting an auction among bidders located at remote locations from the auction site, each of the bidders having a data input device for communicating over a network to the auction site, comprising:

- 5 generating at the auction site asking bids in a plurality of currency valuations;
 monitoring at the auction site the network;
 sensing bidder bid acceptances generated by the bidders utilizing the data input devices during a predetermined time period;
 displaying at the auction site in real-time, current bid acceptances, an asking bid and
10 bidder information; and
 broadcasting in real-time, current bid acceptances, an asking bid and bidder identification to the bidders at the remote locations utilizing the network.

12. The method of Claim 11 wherein the data input devices include telephones and the step of monitoring and sensing includes sensing dual tone multi-frequency signals.

13. The method of Claim 11 wherein the displaying step displays a current bid and an asking bid in a plurality of currency valuations.

14. The method of Claim 11 wherein the step of broadcasting includes broadcasting via television.

AMENDED CLAIMS

[received by the International Bureau on 2 November 1999 (02.11.99);
original claims 1, 8 and 11 replaced by amended claims bearing the same numbers;
claims 2, 3, 9 and 12 cancelled; remaining claims unchanged (3 pages)]

1. An interactive real-time remote auction bidding system for conducting an auction among a plurality of bidders located at remote locations from the auction site, each of the plurality of bidders having a telephone including a dual tone multifrequency transmitter/processor for communicating over a telephone network to the auction site, the system comprising:

means located at the auction site for generating bid information and for transmitting said bid information to the plurality of bidders at the remote locations;

dual tone multifrequency receiver/processors located at the auction site for monitoring the telephone network for bid data generated by the plurality of bidders via the bidder telephones and for capturing bidder bid acceptances generated by bidders utilizing the bidder telephones, such that all of the plurality of bidders participate throughout the entire auction until a final bid is accepted at the auction site; and

means located at the auction site for displaying in real-time, bid information for transmission in real-time to the plurality of bidders at the remote locations.

4. The system of Claim 1 wherein said display means includes a display of a lot number, a current bid, an asking bid, and bidder identification.

5. The system of Claim 1 wherein said display means includes a display of a plurality of currency values representing a current bid and an asking bid.

6. The system of Claim 1 wherein said display means includes a video display of the auction site.

7. The system of Claim 1 wherein said bid information generated by said generating means includes asking bids and asking bid increments.

11. A method for conducting an auction in real-time among a plurality of bidders located at remote locations from the auction site, each of the plurality of bidders having a telephone including a dual tone multifrequency transmitter/processor for communicating over a telephone to the auction site, comprising:

generating at the auction site asking bids;

transmitting acceptances of a bid at the remote location by the plurality of bidders by generating a tone using the bidder telephones, such that all of the plurality of bidders participate throughout the entire auction until a final bid is accepted at the auction site;

monitoring at the auction site the telephone network;

capturing at the auction site bidder bid acceptances generated by the plurality of bidders utilizing the bidder telephones by detecting tones transmitted on the telephone network;

displaying at the auction site in real-time, current bid acceptances, an asking bid and bidder information; and

broadcasting in real-time, current bid acceptances, an asking bid and bidder identification to the plurality of bidders at the remote locations.

13. The method of Claim 11 wherein the displaying step displays a current bid and an asking bid in a plurality of currency valuations.

14. The method of Claim 11 wherein the step of broadcasting includes broadcasting via television.

8. An interactive real-time remote auction bidding system for conducting an auction among a plurality of bidders located at remote locations from the auction site, each of the plurality of bidders having a telephone including a dual tone multifrequency transmitter/processor for communicating over a telephone network to the auction site, the system comprising:

means located at the auction site for generating asking bids, and bid increments;

dual tone multifrequency receiver/processor located at the auction site for monitoring the telephone network for capturing bidder bid acceptances generated by the plurality of bidders utilizing the bidder telephones during a predetermined time period, such that all of the plurality of bidders participate throughout the entire auction until a final bid is accepted at the auction site;

means located at the auction site for displaying in real-time, current bid acceptances, an asking bid and bidder information; and

means located at the auction site for broadcasting in real-time, current bid acceptances, an asking bid and bidder identification to the plurality of bidders at the remote locations.

10. The system of Claim 8 wherein said display means displays a current bid and an asking bid in a plurality of currency values.

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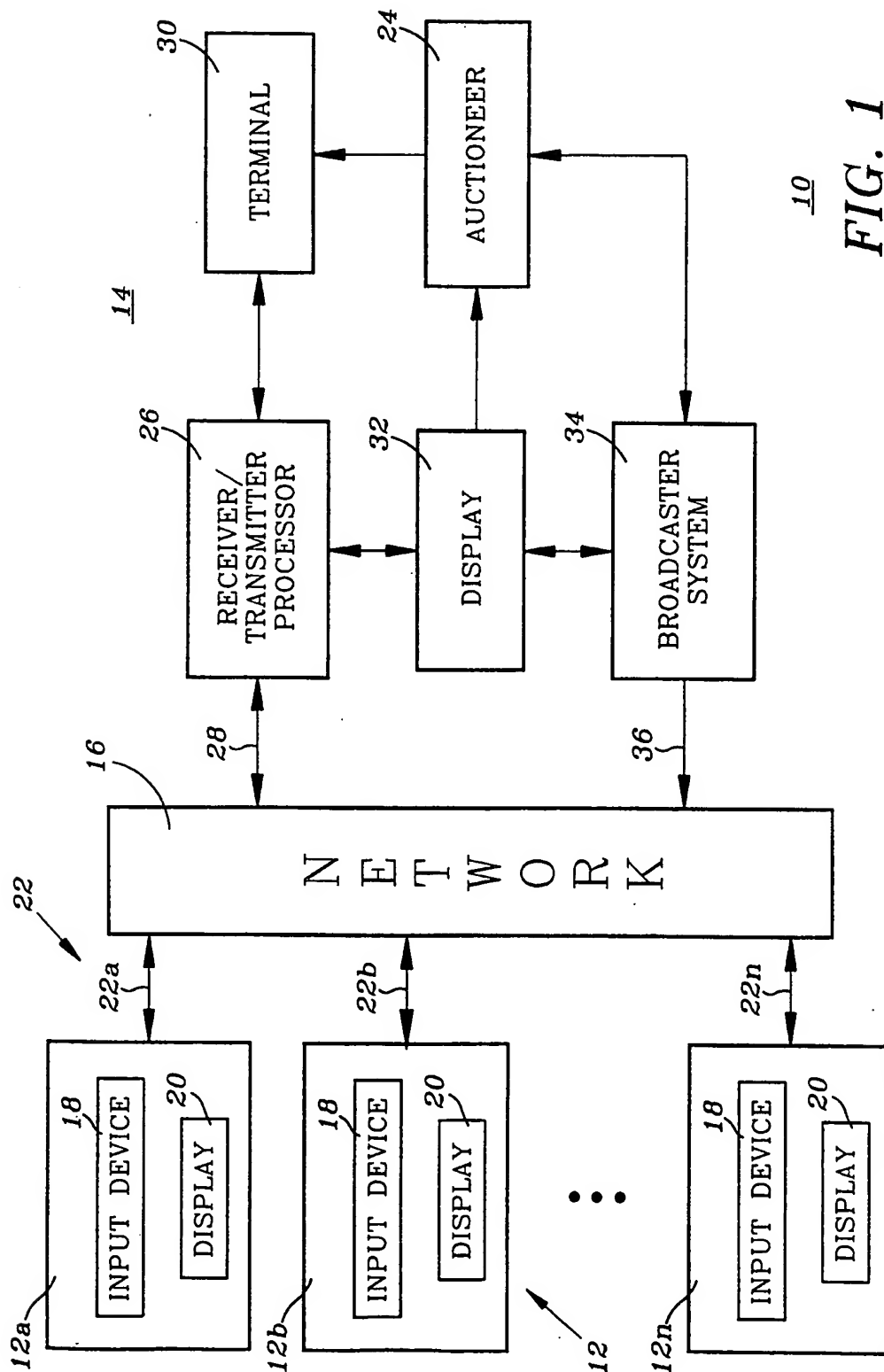


FIG. 1

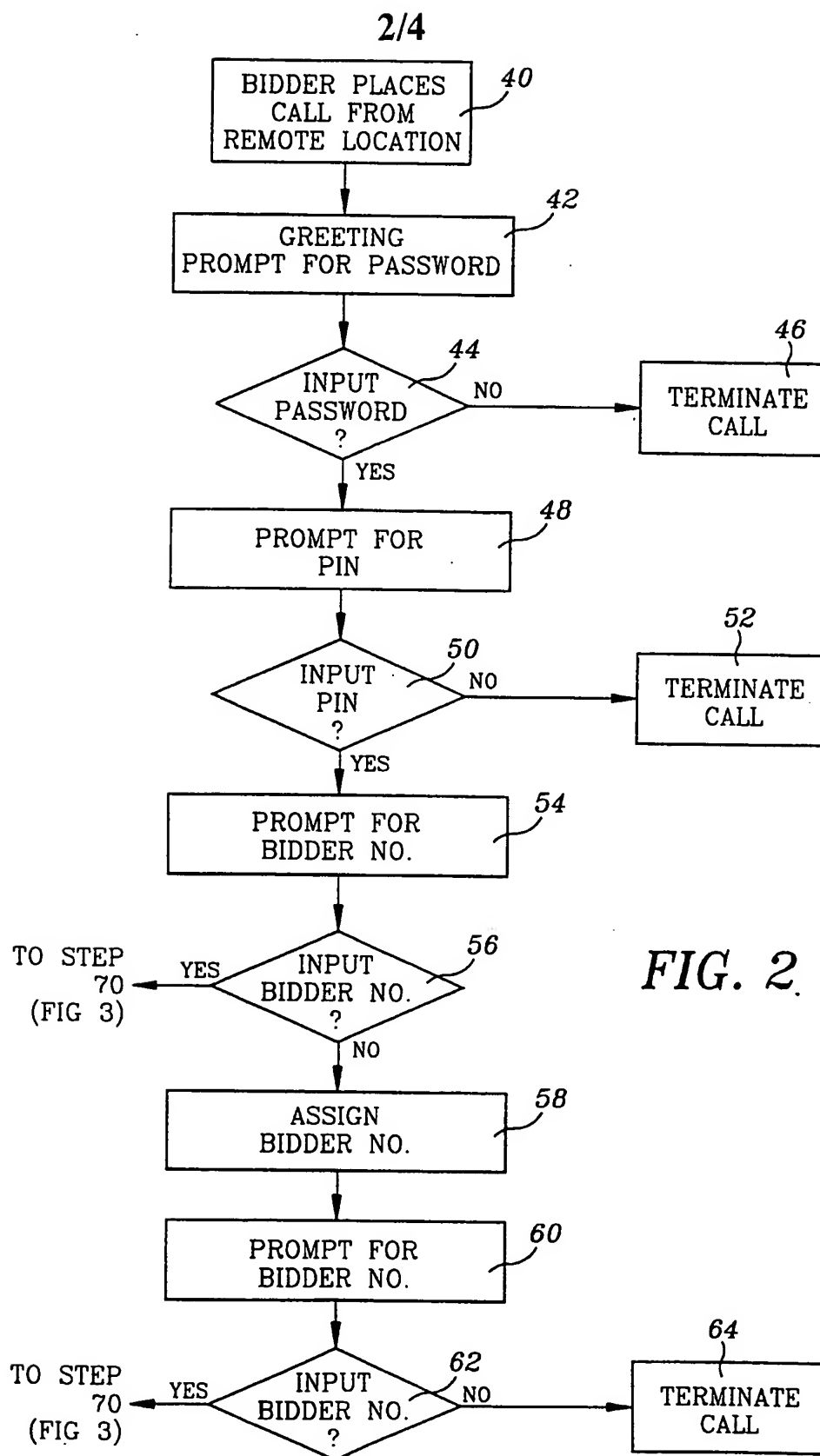


FIG. 2.

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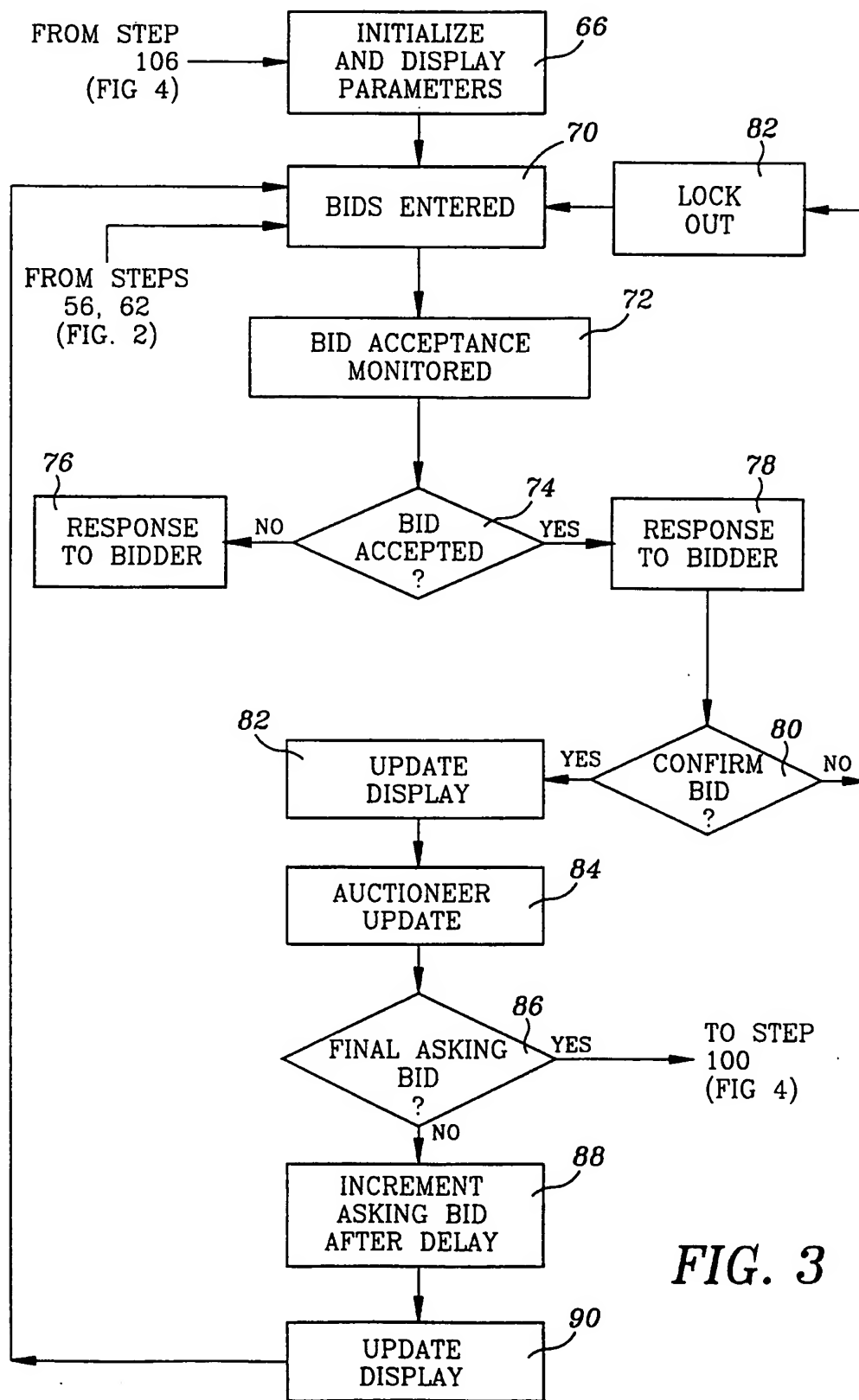
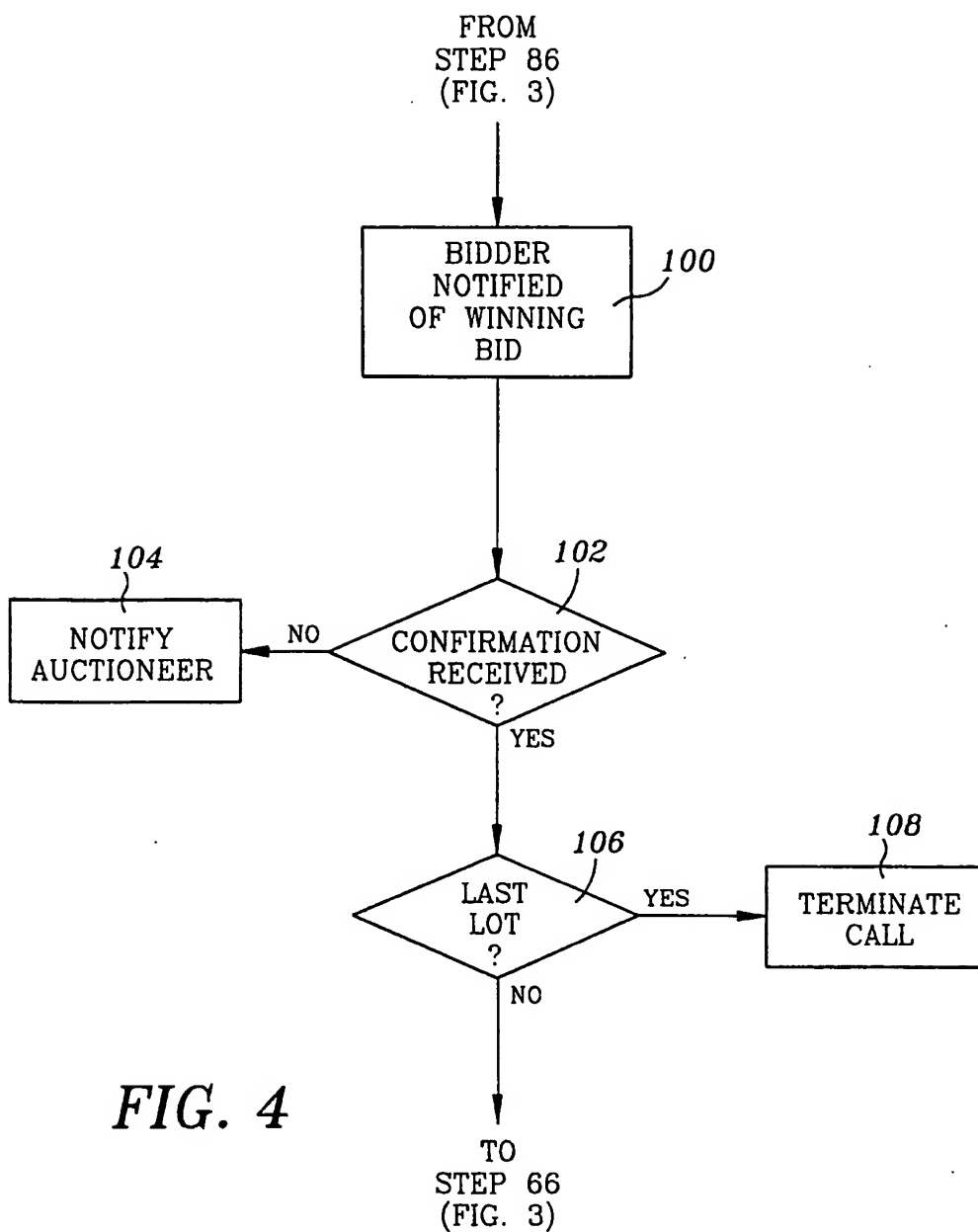


FIG. 3

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INTERNATIONAL SEARCH REPORT

International Application No.

PCT/US 99/11135

A. CLASSIFICATION OF SUBJECT MATTER

IPC 6 G06F17/60

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 6 G06F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 92 15174 A (BEAUMONT MAXIN INTERNATIONAL L) 3 September 1992 (1992-09-03) page 18, line 1 - page 22, line 24 figure 1	1-14
X	WO 97 37315 A (ONSALE INC ; FISHER ALAN S (US); KAPLAN SAMUEL JERROLD (US)) 9 October 1997 (1997-10-09) page 6, line 10 - page 8, line 31	1,3,4,7
A		2,5,6, 8-14
A	NL 9 300 266 A (THEODOOR HUBERTUS MARIA JOSEPH) 1 September 1994 (1994-09-01)	1-14
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☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents:

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Date of the actual completion of the international search

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